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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/532,892

03/22/2000

Makoto Sasaki

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EXAMINER

BROCK II, PAUL E

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 03/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/532,892

Applicant(s)

SASAKI, MAKOTO

Examiner

Paul E Brock II

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 January 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-5, 7, 15, 16 and 20-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7, 15, 16 and 20-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 March 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 – 5, and 20 – 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stamper (USPAT 6111301) in view of Chen (USPAT 5712206).

With regard to claim 1, Stamper discloses in figure 4 and column 3, lines 7 – 20 a semiconductor memory device, including a copper fuse section (2) that is oxidized by a laser beam in an oxidizing environment. Stamper discloses in figure 4 and column 3, lines 7 – 20 a dielectric film (8), including a first film section (bottom 8), a second film section (bottom half of the middle 8 and the left and right 8's) formed on the first film section, and a third film section (top half of the middle 8) formed over the second film section. Stamper discloses in figure 4 and column 3, lines 7 – 20 a wiring line structure (6). Stamper discloses in figure 4 and column 3, lines 7 – 20 a first (left 3 and 6) and a second (right 3 and 6) wiring line, each of the first and second wiring lines formed directly upon the second film section of the dielectric film without an intervening film therebetween and extending in an opposite direction. Stamper discloses in figure 4 and column 3, lines 7 – 20 said copper fuse section formed on the first film section of the dielectric film, an end of the copper fuse section being directly connected to the first wiring line by a first section of the first wiring line which penetrates a portion of the second film

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section, and another end of the copper fuse being directly connected to the second wiring line by a second section of the second wiring line, which penetrates a portion of the second film section. Stamper discloses in figure 4, and column 1 lines 29 – 37 an opening formed in the third and second film sections of the dielectric film and between the first and second wiring lines, wherein the opening provides access to the laser beam to oxidize the copper fuse section in the oxidizing environment. Stamper does not illustrate the opening, and therefore it cannot be determined if sidewalls of the opening are formed only from the third and second film sections. Chen teaches in figure 4 an opening (73) formed in a third (68) and second (64) film sections of a dielectric film and between a first (66, left) and second (66, right) wiring lines, wherein sidewalls of the opening are formed only from the third and second film sections and provide access to a laser beam to oxidize a fuse section (62) in an oxidizing environment. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the opening of Chen in the device of Stamper in order to provide access to the fuse for “blowing” as stated in Chen column 1, lines 40 – 64 and Stamper in column 1, lines 23 – 35.

With regard to claim 2, Stamper discloses in column 2, lines 60 – 61 wherein the dielectric film inherently has a thermal endurance of 350 °C or above. This is an inherent property of silicon dioxide.

With regard to claim 3, Stamper discloses in column 2, lines 60 – 61 wherein the dielectric film has a relative dielectric constant equal to or lower than 4. This is an inherent property of silicon dioxide.

With regard to claims 4 and 5, Stamper discloses in column 2, line 56 wherein at least one of the first wiring line, the first section of the first wiring line, the second wiring line, and the second section of the second wiring line includes copper.

With regard to claim 20, Stamper discloses in figure 4 a dielectric film including a first film section formed over a substrate, a second film section formed on the first film section, and a third film section formed on the second film section. Stamper discloses in figure 4 a first wiring line and a second wiring line, each of the first wiring line and the second wiring line being formed on the second film section of the dielectric film. Stamper discloses in figure 4 and column 1, lines 13 – 35 the copper fuse formed on the first film section of the dielectric film, an end of the copper fuse being directly connected to the first wiring line by a first section of a first wiring line, which penetrates a portion of the second film section, and another end of the copper fuse being directly connected to the second wiring line by a second section of the second wiring line, which penetrates a portion of the second film section, and the copper fuse being programmed to a high resistance state by oxidation. Stamper discloses in figure 4 and column 1, lines 13 – 35 an opening formed in the third and second film sections of the dielectric film and between the first wiring line and the second wiring line. Stamper discloses in figure 4 and column 1, lines 13 – 35 wherein the high resistance state results from a cross section of the copper fuse being oxidized to copper oxide and the cross section is located in the opening. Stamper does not illustrate the opening, and therefore it cannot be determined if sidewalls of the opening are formed only from the third and second film sections. Chen teaches in figure 4 wherein sidewalls of an opening (73) are formed only from a third (68) and second (64) film sections and a high resistance state results from a cross section of a fuse being oxidized to oxide

and the cross section is located in the opening. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the opening of Chen in the device of Stamper in order to provide access to the fuse for “blowing” as stated in Chen column 1, lines 40 – 64 and Stamper in column 1, lines 23 – 35.

With regard to claim 21, Stamper discloses in column 2, lines 60 – 61 wherein the dielectric film inherently has a thermal endurance of 350 °C or greater. This is an inherent property of silicon dioxide.

With regard to claim 22, Stamper discloses in column 2, lines 60 – 61 wherein the dielectric film has a relative dielectric constant equal to or lower than 4. This is an inherent property of silicon dioxide.

With regard to claim 23, Stamper discloses in column 2, line 56 wherein at least one of the first wiring line, the first section of the first wiring line, second wiring line and the second section of the wiring line includes copper.

3. Claims 7, 15 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stamper and Chen as applied to claim 1 and 20 above, and further in view of Huang et al. (USPAT 6162686, Huang).

Stamper and Chen are silent on a third wiring line formed of copper on the first dielectric film. Huang teaches in figure 5 and column 6, lines 20 – 22 a semiconductor memory device that comprises a wiring line (44(M2)) formed on a first section of a first dielectric film (30). It would have been obvious to one of ordinary skill in the art at the time of the present invention to

use the wiring line of Huang in the device of Stamper and Chen in order to connect devices together as stated by Huang in column 4, lines 25 – 35.

With regard to claim 15, Huang teaches in figure 5 and column 6, lines 20 – 22 wherein the wiring line includes copper.

4. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stamper, Chen and Huang as applied to claims 1 and 7 above, and further in view of Shih et al. (USPAT 6100118, Shih).

With regard to claim 16, Stamper, Chen and Huang are silent to the teaching that the wiring line is disposed parallel to a wiring line structure. Shih teaches in figure 3 wherein a wiring line (42) is disposed parallel to a wiring line structure (31a and 31b). It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the parallel lines of Shih in the device of Stamper, Chen and Huang in order to have extensive interconnections on each wiring layer.

#### ***Response to Arguments***

5. Applicant's arguments filed January 30, 2003 have been fully considered but they are not persuasive.

6. With regard to the applicant's arguments suggesting that "[Stamper discloses a] via 4... formed that includes sidewalls 3 of the corrosion barrier, presumably tungsten or the like, and back and presumably front walls of silicon dioxide 8," and "Stamper discloses a via 4, which corresponds to the present invention's opening," it should be noted that the via (4) of Stamper is

the location wherein the copper (9) and tungsten corrosion barrier layers are formed. These conductive structures of copper and tungsten are formed in the via, and electrically connect the copper lines (6) with the copper fuse (2). Nowhere in Stamper is it suggested that via 4 is the opening that provides access to the fuse for laser oxidation. While Stamper does disclose in column 1, lines 28 – 34 that an opening providing access to the fuse for laser oxidation does exist, it is not clear what any sidewalls of this opening would comprise. Chen has been used as a teaching of what the sidewalls would comprise. Therefore, the applicant's arguments are not persuasive, and the rejection is proper.

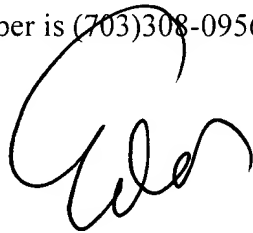
### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul E Brock II whose telephone number is (703)308-6236. The examiner can normally be reached on 8:30 AM-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703)308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7722 for regular communications and (703)308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Paul E Brock II  
March 11, 2003



**EDDIE LEE**  
**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 2800**